

## REMARKS

Claims 1-15, 17-35, 37-47, 49-51 and 53-74 are presented for consideration.

As will be appreciated, claims 1-15, 17-35, 37-47, 49-51 and 53-55 were previously allowed. Claims 21, 26, 28, 40 and 56 has been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record.

Claims 57-72 have been added to assure Applicant of the full measure of protection to which he deems himself entitled. Claims 1, 6-8, 20, 21, 26-28, 40, 49-51, 53-56, 62, 64 and 71 are independent.

Claims 21, 26, 28 and 40 have been amended to correct inadvertent typographical errors.

U.S. Patent 6,341,006 (Murayama et al.) based on Japanese Patent Laid-Open No. 08-279458, U.S. Patent 5,892,572 (Nishi) based on Japanese Patent Laid-Open No. 07-176477 and Japanese Patent Laid-Open No. 61-79228 (JP Document '228) have been cited in an Information Disclosure Statement filed herewith.

According to the invention of previously allowed Claims 1, 6-8 and 20, first and second different gases are supplied by first and second gas supply units to a chamber and a switching mechanism supplies one of the first and second gases by switching between first and second gas supply units.

In Applicant's view, Murayama et al. discloses a projection exposure apparatus that projects a pattern image of an illuminated mask onto a substrate. The optical path can be divided into a plurality of hermetic blocks each having an inert gas sealed therein by a plurality of partition devices. A hermetic sealing member is disposed in the space between

the substrate-side of the projection optical system and the substrate to replace the atmosphere existing in the optical path of the illuminating light in that space by a substance other than oxygen. Plural independent chambers are formed in a frame. Lids, piping, and valves in the chambers are opened or closed in response to the value detected by oxygen density sensors.

In Applicant's opinion, Nishi discloses a projection exposure apparatus that has an exposure processing section for projecting and exposing an image of a pattern of a reticle on a photosensitive substrate. An environmental chamber covers the exposure processing section and a fan unit supplies a temperature-controlled gas to the environmental chamber. Exposure to the photosensitive substrate is carried out in a temperature-controlled atmosphere. The pressure of the gas in the environmental chamber is monitored by a pressure sensor. When the pressure is changed, the mixture ratio of the gas supplied to the environmental chamber is changed to keep the refractive index of the gas in the chamber constant thereby to prevent imaging characteristics of the projected image from deteriorating.

JP Document '228 discloses arrangements for supplying a single gas or a mixture of different kinds of gases to spaces between lenses. In Fig. 1, a gas supply source 13 supplies a single composition gas to a gas reservoir 14. The gases are mixed in a predetermined ratio to have a desirable refractive index and the mixture is supplied to spaces between lenses to correct variations in magnification and focus. In Fig. 3, gases of different refractive indices are supplied to mixing chambers to provide a desirable refractive index into spaces between lenses.

The cited references may teach changing a gas in a sealed chamber of an optical unit or mixing gases supplied to a chamber to obtain different refractive indices. None of the cited references, however, teaches or suggests the feature of independent Claims 1, 6-8 and 20 of a switching arrangement that supplies first and second different gases to a chamber by switching between first and second gas supply units. Accordingly, it is believed that Claims 1, 6-8 and 20 are completely distinguished from Murayama et al., Nishi and JP Document '228 and are allowable.

It is a feature of independent Claims 21, 26-28, 40, 49-51 and 53-55 that, in a gas replacement arrangement, first and second different gases are sequentially supplied into a chamber. Murayama et al. only teaches replacing atmosphere in a chamber with a substance other than oxygen and Nishi and JP Document '228 are restricted to supplying a mixture of gases into a chamber to control the refractive index. As a result, it is not seen that these references in any manner teach or suggest sequentially supplying first and second different gases into a chamber as in Claims 21, 26-28, 40, 49-51 and 53-55. It is therefore believed that 21, 26-28, 40, 49-51 and 53-55 are completely distinguished from Murayama et al., Nishi and JP document '228 and are allowable.

Independent Claim 56 as currently amended is directed to exposure apparatus in which a first gas supply unit supplies a first gas into a chamber and a second gas supply unit supplies a second gas different from the first gas into the chamber. The first gas has a higher molecular weight than the second gas and the supply of the first gas into the chamber starts before the supply of the second gas into the chamber starts.

Newly added independent Claim 64 is directed to a gas replacement method in which a first gas is supplied into a chamber in a first supply step and a second gas different from the first gas into the chamber. The first gas has a higher molecular weight and the first supplying starts before the second supplying starts.

In accordance with the invention defined in Claim 56 as currently amended and new added Claim 64, first and second gases are supplied to the chamber of an exposure apparatus, the first gas has a higher molecular weight, and the first gas supplying is started before the second gas supplying is started.

As discussed with respect to Claims 21, 26-28, 40, 49-51 and 53-55, Murayama et al. is restricted to replacing atmosphere in a chamber with a substance other than oxygen and Nishi and JP Document '228 require supplying a mixture of gases into a chamber to control the refractive index. Accordingly, it is not seen that these references in any manner teach or suggest the feature of first and second gases supplied to a chamber wherein the first gas has a higher molecular weight and the supply of the first gas is started before the supply of the second gas is started. It is therefore believed that Claim 56 as currently amended and newly added Claim 64 are completely distinguished from Murayama et al., Nishi and JP document '228 and are allowable.

Newly added independent Claim 62 is directed to exposure apparatus in which a nitrogen supply unit supplies nitrogen into a chamber and a helium supply unit supplies helium into the chamber. The nitrogen supply unit replaces atmosphere in the chamber with nitrogen, after which the helium supply unit replaces the nitrogen with helium.

Newly added independent Claim 71 is directed to a gas replacement method in which atmosphere in a chamber is replaced with nitrogen in a first step and the nitrogen in the chamber is replaced by helium after the first step.


Newly added Claims 62 and 71 recite the feature of a nitrogen supply unit that replaces atmosphere in a chamber with nitrogen after which a helium supply unit replaces the nitrogen in the chamber with helium. The cited references only relate to replacing atmosphere in a chamber with a substance other than oxygen or supplying a mixture of gases into a chamber to control the refractive index but fail to suggest anything about the sequential replacement arrangement of Claims 62 and 71. Accordingly, it is believed that newly added Claims 62 and 71 are completely distinguished from Murayama et al., Nishi and JP document '228 and are allowable

It is respectfully submitted that the amendments presented herein do not affect the allowability of the previously allowed claims, that no new matter has been added and that Claim 56 as currently amended and newly added Claims 57-72 are allowable.

Favorable consideration hercof and early passage to issue of the present application are earnestly solicited.

Applicants' attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our New York office at the below-shown address.

Respectfully submitted,

  
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